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(56) Documents cited

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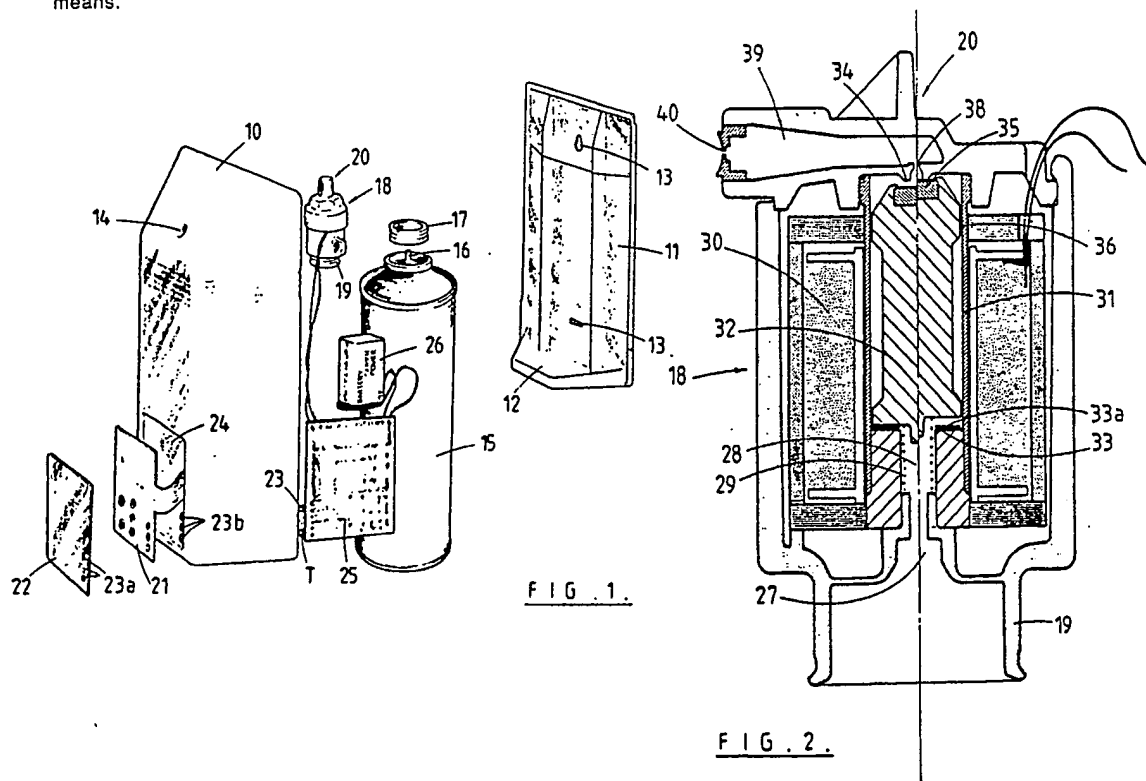
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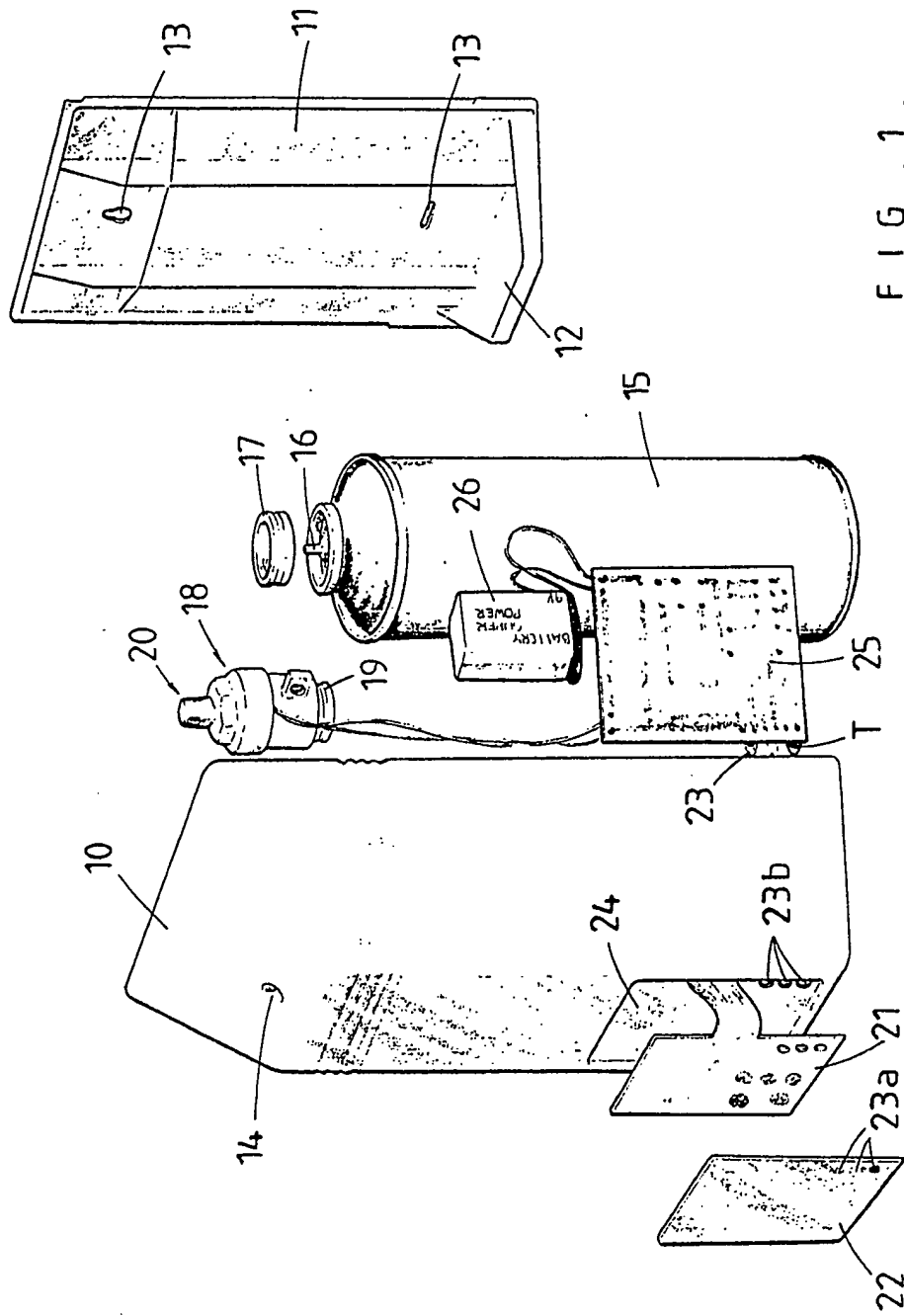
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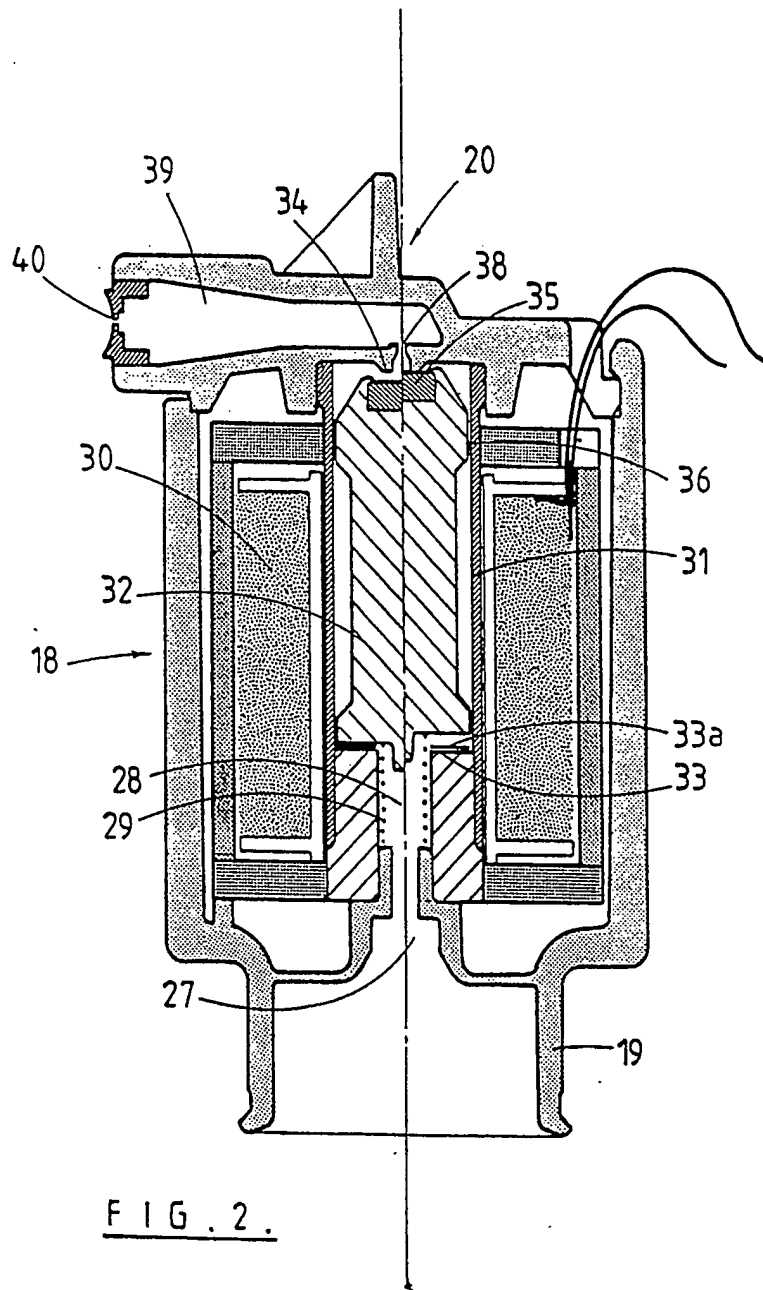
## (54) An aerosol dispenser

(57) An aerosol dispenser comprises a housing (10, 11) within which an aerosol container (15) can be removably located. A dispensing nozzle arrangement (40) is provided through which aerosol contained in the container can be dispensed. A valve means (18) provides communication between an outlet of the aerosol container and the spray nozzle arrangement. Electronic control means activate the valve means so as to facilitate a metered dosage of aerosol to be dispensed from said spray nozzle arrangement. In the preferred arrangement the valve means includes a solenoid (30) for operation of the valve means.



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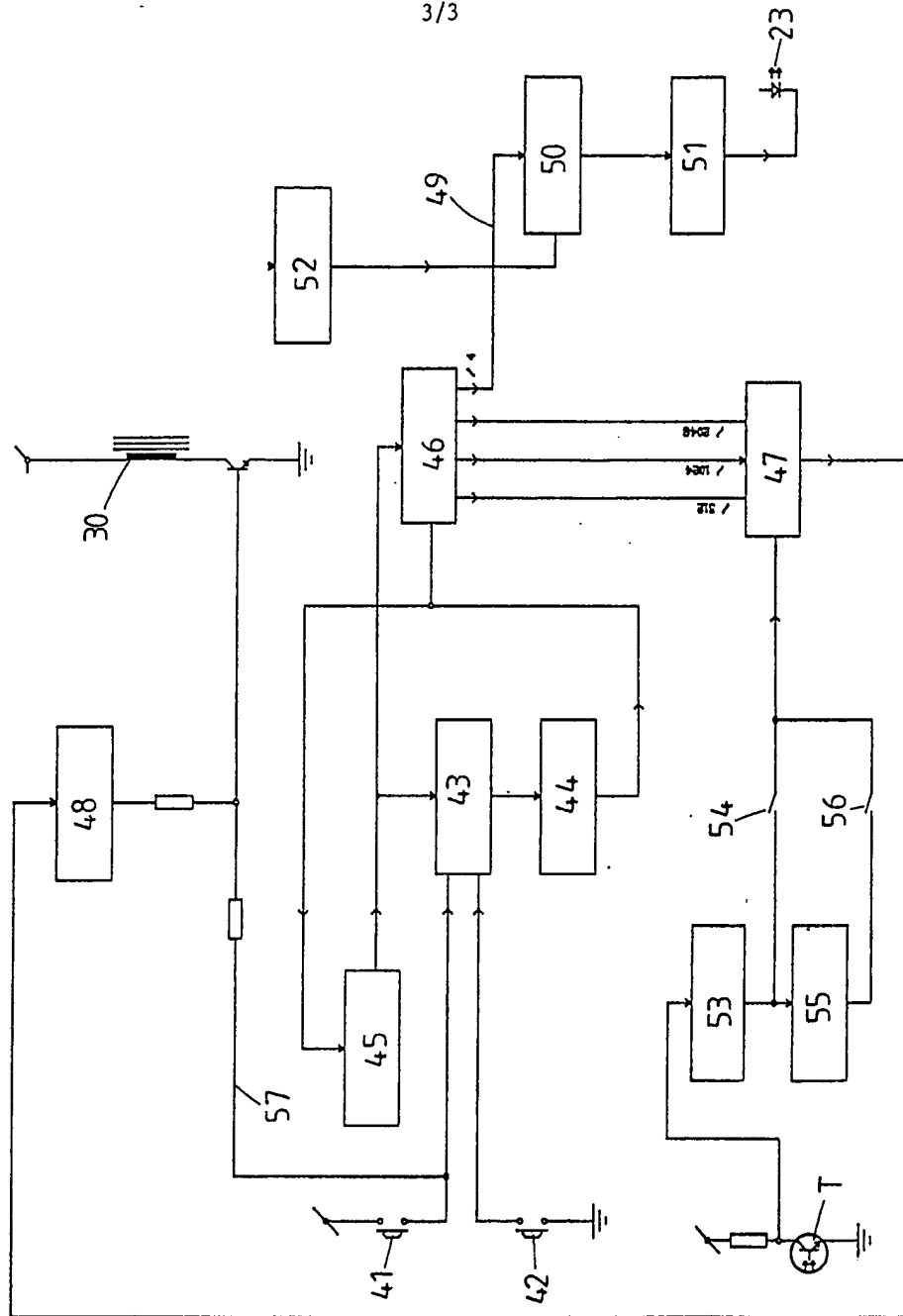


FIG. 3

This invention relates to an aerosol dispenser.

It is known to provide aerosol dispensers which permit metered dispensing of an aerosol spray such as an insecticide, air freshener, sanitizer etc. Thus when dispensing an insecticide such dispensers can be used to control flies, insects etc. by automatically, at pre-set intervals, dispensing spray into the environment.

The object of the present invention is to provide an aerosol dispenser which is of improved design and function or at least provides the public with an alternative to those hitherto known.

Broadly the invention consists of an aerosol dispenser which comprises a housing within which an aerosol container can be removably located, a dispensing nozzle arrangement through which aerosol contained in the container can be dispensed, valve means providing for communication between an outlet of the aerosol container and the spray nozzle arrangement, and electronic control means for activation of the valve means to facilitate a metered dosage of aerosol to be dispensed from said spray nozzle arrangement. Preferably said valve means is solenoid operated.

In the following more detailed description of the invention according to a preferred form reference will be made to the accompanying drawings in which:-

Figure 1 is an exploded perspective view of the dispenser,

Figure 2 is a cross-section view of the valve means and

Figure 3 is a block circuit diagram of the electronic control means.

Referring to Figure 1 of the drawings the housing is formed by a shaped cover 10 and a mounting plate 11 said mounting plate including a drip tray 12. Apertures 13 are provided whereby the mounting plate can be attached to a wall or any other suitable support surface.

An upper sloping wall surface of cover 10 includes a nozzle opening 14 with an integral drip catcher. Thus an aerosol container 15 can be located on drip tray 12 and covered by cover 10.

The outlet 16 of aerosol container 15 has mounted thereon a valve 18 with a one piece adapter collar 17 being provided for this purpose. The outlet (shown generally at 20) of valve 18 thus communicates with nozzle opening 14 so that an aerosol spray from container 15 can be dispensed via valve 18 through a nozzle communicating with opening 14. Valve 18 is mounted to aerosol container 15 by end 19 (being of skirt form) snap engaging via adapter collar 17.

The front vertical wall of cover 10 includes a recess 24 in which a circuit board 21 is located and covered by cover plate 22. A circuit board 25 is also located within cover 10 and this includes an LED 23 which engages through one of openings 23b in recess 24. The LED is visible from external of cover 10 through one of windows 23a in cover plate 22. A photo transistor T is located in alignment with another window 23a via an aligned opening 23b.

Power for the electronic control arrangement is derived from a conventional battery or pack of batteries 26 which

is coupled in a conventional manner to circuit board 25. Valve means 18, which is solenoid operated, is also coupled via leads to the circuit board 25.

As shown in Figure 2 the valve 18 comprises a body having skirt 19 at a lower end thus when the valve 18 is located on aerosol container 15 the outlet 16 of the container locates within a recess 27. Recess 27 is in communication with a passage 28. Located within passage 28 is a spring 29.

Located within the valve body is a solenoid indicated generally at 30. A sleeve 31 is located between valve member 32 and the solenoid coil, this sleeve 31 being coaxial with chamber 27 and passage 28 and effectively providing a guide within which valve member 32 can slidably move.

Figure 2 of the drawings shows to the left hand side of the centre line valve 18 in its open position whereas to the right hand side of the centre line the valve is shown in its closed position. Thus a seating 33 is provided at the outlet end of passage 28 such that when the valve is in the open position the end of valve element 32 locates on a plastic "C" washer 33a positioned on seat 33. In the closed position, however, valve element 32 is lifted away from seat 33.

The opposite end of valve element 32 includes a seating pad 35 (preferably made of a rubber material) which, when the valve is in the closed position locates against seat 34.

Thus in the closed position of the valve spring 29 forces valve element 32 so that seating element 35 engages on seat 34 thus closing a metering orifice 38. Upon

operation of the solenoid 30, however, valve element 32 is drawn back against the bias of spring 29 such that the lower end of valve element 32 seats via washer 33a on seat 33. This draws seating element 35 away from seat 34 thus aerosol spray which has been prior dispensed from container 15 via outlet 16, recess 27 and passage 28 to fill the space within sleeve 31 (a clearance 36 being provided between the radial projecting portions of valve element 32) is permitted to flow out through metering orifice 38 into dispensing chamber 39 and then through mechanical break up nozzle 40 which is in communication with opening 14 in cover 10.

The amount of aerosol dispensed is determined by the time that the solenoid operated valve is open. Thus generally the volume of spray within sleeve 31 is not fully dispensed during the open period of the valve. When valve member 32 returns to the closed position aerosol spray from container 15 via its outlet 16 flows till there is a pressure balance between the chamber defined between sleeve 31 and valve element 32 and the interior of container 15.

Operation of valve 18 and the time during which the valve is open is carried out electronically and to further describe the invention reference will now be made to Figure 3 of the drawings which illustrates a circuit arrangement of a preferred form of the electronic control means.

Circuit board 21 located in recess 24 incorporates a pressure activated "on" switch 41 and an "off" switch 42. The dispenser is thus activated by pressing "on" switch 41 which causes capacitor 43 to commence charging and this in turn causes the clock oscillator 45 to operate and allows a clock divider chip 46 to start dividing. The clock in a



preferred form of the invention runs at 0.7 seconds and the divider 46 establishes intervals for the output to the spray solenoid 30 such intervals being adjustable by dip switches associated with the select gate 47. Thus for example the outputs from divider 46 can provide division by 512, 1024 and 2048 to give six, twelve and twenty-four minute outputs or by selecting combinations of such divisions other output intervals. The output from the select gate 47 thus operates solenoid on timer 48 which is set at a constant time such as for example 0.022 seconds.

Line 49 from divider 46 is connected through a pulse shortener 50 to an LED driver 51 which drives LED indicator 23. The output 49 from divider 46 provides division by a number, such as for example four, which controls flashing of LED 23 to indicate that the dispenser is working correctly and that the battery condition is good. There is, however, provided a low battery detector 52 which when detecting a battery condition of say 10% causes, via pulse controller 50, the LED to have longer flashes. Furthermore when the battery condition has reached a critical point such as 5% the low battery detector via the pulse controller 50 causes the LED to give even longer flashes.

Thus as battery voltage decreases the LED on time increases to a point where the user is aware that the battery condition is near being unsuitable for continued reliable operation of the solenoid valve. In the event that the battery gets low when the dispenser is turned off, the LED gives a "steady glow" until the battery is completely dead.

When used as an insecticide spray there is no requirement for the dispenser to operate during hours of darkness thus photo transistor T is coupled via a threshold detector 53

which is in turn connected via a day switch 54 to the select gate 47. Threshold detector 53 is also coupled to an inverter 55 which is connected to the select gate 47 via a night switch 56.

Upon the threshold detector 53 detecting an output from photo transistor T which is indicative of night time the day switch 54 (which is closed to lock out the night function) opens and night switch 56 is closed thereby causing the dispenser to cease operation. However, when photo transistor T once again goes lo this is detected by the threshold detector 53 and the positions of switches 54 and 56 are reversed thereby automatically causing the dispenser to recommence operation.

When operation of the dispenser is not required stop switch 42 is activated which causes capacitor 43 to fully discharge and thereby completely shut down operation of the unit.

If manual operation is required switch 41 can be pressed at any time during which the dispenser is operative and via line 57 the solenoid on timer 48 will cause solenoid 30 to function as previously described.

All the operation times and divider ratios stated herein are only by way of example and can be changed to suit the product in the aerosol container and/or battery requirements.

Circuitry according to the illustrated form is not only effective in providing correct and adjustable dispensing intervals but also results in low power consumption thereby enhancing battery life. The provision of the LED 23 ensures that the user of the dispenser is aware that the dispenser is operating or is in a condition whereby

7

some rectification steps need to be taken such as replacement of the battery.

CLAIMS

1. An aerosol dispenser which comprises a housing within which an aerosol container can be removably located, a dispensing nozzle arrangement through which aerosol contained in the container can be dispensed, valve means providing for communication between an outlet of the aerosol container and the spray nozzle arrangement, and electronic control means for activation of the valve means to facilitate a metered dosage of aerosol to be dispensed from said spray nozzle arrangement.
2. The dispenser according to Claim 1 wherein the valve means includes a solenoid for operation of the valve means.
3. The dispenser according to Claim 2 wherein the valve means includes a valve element which is movable by the solenoid between a position (open) where said aerosol can be dispensed from said spray arrangement and a position (closed) where dispensing of aerosol is prevented.
4. The dispenser according to Claim 3 wherein the nozzle arrangement includes a metering orifice in communication with a nozzle, there being a seating associated with said metering orifice with which said valve element seats in the closed position.
5. The dispenser according to Claim 4 wherein the nozzle is of a mechanical break up type.
6. The dispenser according to Claim 4 or 5 wherein the valve means includes a body portion which houses the said solenoid, said body having a mounting arrangement whereby the body can be mounted on the outlet end of an

aerosol container, there being a flow passage along which aerosol from the container can flow.

7. The dispenser according to Claim 6 wherein there is a second seating with which said valve element seats when in the open position such as to prevent flow from said flow passage occurring.

8. The dispenser according to any one of Claims 3 to 7 wherein the valve element is biased by biasing means into said closed position.

9. The dispenser according to Claim 8 wherein said valve element is slidably located within a guide such that at least part of the valve element is located within the confines of the core of said solenoid.

10. The dispenser according to Claim 9 when appendant to Claim 6 or 7 wherein a space exists between said valve element and the guide such that when the valve element moves from the open to closed position aerosol from the container can flow from said flow passage and into said space.

11. A dispenser as claimed in any one of Claims 4 to 6 wherein said valve element is slidably engaged in a guide into which aerosol from the container can flow when the valve element moves from an open to closed position and be retained therein, said metering orifice being in communication with said guide.

12. The dispenser as claimed in Claim 11 wherein said guide is located within said solenoid.

13. The dispenser according to any one of the preceding Claims wherein said control means includes adjustable timing means to time the period during which the valve element is in the open position.

14. The dispenser according to Claim 13 wherein the timing means also times the intervals between which the valve element moves to the open position.

15. The dispenser according to Claim 13 or 14 wherein the control means further includes detection means to prevent operation of the valve element upon said detection means detecting pre-determined ambient conditions.

16. An aerosol dispenser substantially as herein described with reference to the accompanying drawings.

**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number  
9121955.0

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| <b>Relevant Technical fields</b><br>(i) UK Cl (Edition K ) F1R (RDC)<br><br>(ii) Int Cl (Edition 5 ) B65D | <b>Search Examiner</b><br><br>D DODD          |
| <b>Databases (see over)</b><br>(i) UK Patent Office<br><br>(ii)   | <b>Date of Search</b><br><br>30 DECEMBER 1991 |

Documents considered relevant following a search in respect of claims 1, 2

| Category<br>(see over) | Identity of document and relevant passages      | Relevant to<br>claim(s) |
|------------------------|---|-------------------------|
| X                      | GB 1598372 A (FOJON) whole document             | 1,2<br>at least         |
| X                      | EP 0038598 A1 (CHOUSTOULAKIS) whole<br>document | 1,2<br>at least         |
| A                      | GB 1021586 A (OWENSMITH) whole document         | -                       |



| Category | Identity of document and relevant passages | Relevant to claim(s) |
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